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possessing a chlorophyll-like pigment (called metachlorophyll by Mr. Poulton) in the blood. By means of a micro-spectroscope the most characteristic absorption-band of the pigment, together with its resemblance to chlorophyll, was shown.—The well-known American entomologist, Mr. A. R. Grote, has been presented by His Highness the Duke of Saxe Coburg-Gotha (brother-in-law of Her Majesty the Queen) with the large Silver Medal, *Princeps Musarum Sacredos*, for Art and Science.—The January number of the *Wiener Ent. Zeit.* contains the second and concluding part of the Supplement to the Monograph of the Cæstridæ by Dr. Brauer. In this part the characters of the fully-developed larvæ are discussed, and an analytical table of the genera given. There is also an analytical table for determining the genera of the adult insects.

#### ZOOLOGY.

**Fauna of Novaia Zemlia.**—Anton Stuxberg contributes to the fifth volume of the scientific results of the "Vega" expedition a review of the fauna of Novaia Zemlia. Of the sixteen mammals he enumerates two lemmings, one wolf, two foxes, the polar bear, and the reindeer as terrestrial; all the others are marine. The birds number forty-one. The fishes are not enumerated, but one is struck with the relative proportions of the different orders of Hexapods. Of these the Diptera number eighty-two, the Hymenoptera forty-six, and the Collembola sixteen out of a total of one hundred and fifty-four. The only Myriapod is a species of Lithobius. The Arachnids number forty-eight. Of the Crustacea only the Malacostraca are included. Of these there are ninety-six, sixty-one of this number being Amphipods. The Chætopods are one hundred and twenty-three in number, the true Molluscs one hundred and twenty, the Echinoderms thirty-seven. The total is seven hundred and forty-two species.

**Pelagic Fauna of German Lakes.**—Dr. Otto Zacharias read a paper at the late meeting of German naturalists and physicians in Berlin on the pelagic fauna of the North German lakes. The results of the exploration of fifty-six bodies of water were that there was a great similarity between their pelagic fauna and that of the Swiss and Northern Italian lakes. Some novelties were obtained: a new species of Ceriodaphnia, two of Bosmina, etc. The catalogue of his collections shows that there is a considerable similarity between these North German lakes and those of our Northern States, so far as pelagic invertebrates are concerned.

**The Structure of Fungia.**—Mr. Gilbert C. Bourne, who has been enabled by a grant of funds to visit the East Indies, gives in the January number of the *Quarterly Journal of Microscopical Science* (xxvii. p. 293) an account of the structure of a species of

mushroom coral occurring at the island of Diego Garcia. He did not succeed in finding the budding phase which has been described by Moseley, nor did he find any ova or spermatozoa. He gives somewhat detailed accounts of the soft parts, and shows that in these forms the tentacles are arranged in circles, there being seven circles in his species which correspond to the seven orders of septa. In describing the internal structure Mr. Bourne has coined the term *mesogloea* for the third layer which separates the ectoderm and entoderm in all Coelenterates. This layer is frequently called mesoderm, but it is far from proven that it is homologous with the layer called by that name in the higher Metazoa. The new term signifies middle jelly, and hence corresponds to the terms *Gallertssubstanz* and *Gallertanlage* of the Germans. The mesenteries are described, together with the mesenterial filaments, which, by the way, our author has not seen protruded from the cinclides in the species studied by him. In the endoderm he found peculiar masses of rounded nucleated cells, which, from their turning blue when treated with iodine, he regards as symbiotic algæ. His observations on the relation of the animal to the skeleton are regarded as confirmative of Von Koch's views of the formation of the latter.

**The Life-History of the Hydromedusæ.**—Under this title Dr. W. K. Brooks presents an extensive paper in the third volume of the *Memoirs of the Boston Society of Natural History*, illustrating his points by eight plates. He describes the life-histories of *Cunocantha*, *Liriope*, *Turritopsis*, and *Eutima*, four genera which are taken as representatives of as many groups of Hydromedusæ. From these the author arrives at the same conclusions as Böhm and Claus: that the medusa form is primitive, the hydra condition being a secondary development in the phylogeny of the Hydrozoa; a view diametrically opposite from that usually held. The various types of alternation of generations exhibited by these forms are placed in their proper sequence, and it is pointed out that, on the supposition that the primitive hydrozoan had a hydra-like condition, the modifications exhibited are utterly inexplicable, while, if the reverse be assumed, these alternations are readily seen to be the results of a free swimming ancestral stage. The existence of a true gastrulation in the Coelenterates is questioned. A critical review of the literature of the development of the Hydromedusæ is given.

**Turning Hydra inside out.**—Trembley's oft-described experiment of turning the fresh-water *Hydra* inside out has but rarely been repeated, Professor Mitsikuri, of Tokio, being the only person who had been successful until a recent date. According to the accounts, the *Hydra* in this condition lived as well as before, its digestive layer functioning well as skin, while the skin took

upon itself the capacity of assimilation. Recently M. Nussbaum took up the problem, and, according to his account as presented in the *Biologisches Centralblatt*, the layers do not thus change place. There appears, indeed, an ectoderm, but this arises, not from an alteration of the endoderm, which has taken an external position by the operation of turning inside out, but by a growth of ectoderm from that of the basal pore and from the tentacles. He further maintains that ectoderm is always ectoderm, and endoderm can never be modified into any other layer. In regard to the reproduction of lost parts described by both Baker and Trembley, as well as many later observers, Nussbaum says that both layers must be present in order to have the missing portions reproduced.

**Renal Organs of Invertebrates.**—Dr. McMunn has recently been investigating the subject of so-called renal organs in various molluscs as well as in the cockroach. The method was to boil the suspected organ in distilled water to dissolve the uric acid or urates. The solution was then evaporated, extracted with absolute alcohol, and then the residue was boiled again in water, filtered, and to the filtrate acetic acid was added in excess, and, after some hours' standing, crystals of uric acid and urates were distinguished under a one-fifth objective. Other chemical tests were applied and with the same results. The conclusion was that the so-called urinary or Malpighian tubules of insects and the nephridia of *Limax* and *Helix* are in reality urinary in function, as has been heretofore believed.

**Migration of Frogs.**—A peculiar migration of frogs takes place in the valley of the Red River of the North. The water of this river is green, like that of the Great Lakes, and the bottom is composed of soft clay several feet thick, which the frost never penetrates. To the west of the river, in Dakota, are numerous prairie sloughs, which freeze in winter. The frogs hibernate in the river bottom during winter, but every spring the entire army migrates to the sloughs, returning *en masse* in the fall. I used to regard the exaggerated newspaper accounts of these migrations as fictions; but last autumn, in Fargo, I saw the frogs hopping towards the river in large numbers and the citizens gather them for a two-weeks' feast. The river is very low and the banks very dry in summer, and the frogs are obliged to migrate or die of starvation, as their favorite fly loves water-plants.—*W. H. Ballou.*

**Brazilian Reptilia.**—Professor E. D. Cope recently read a paper on a collection made by Mr. H. H. Smith near Cuyabá, in the southern interior of Brazil. He derived from it a good many interesting results, especially to the knowledge of Geo-

graphical Distribution. Such are the great extension of the range of the anurous genus *Prostherapis* among Batrachia, of *Anolis* and *Scartiscus* among lizards, and of *Rhynchonyx* and *Dirrhox* among snakes. The rediscovery of a few species brought from the same region a half-century ago by the Austrian Johann Natterer is of considerable interest. Such are the species *Paludicola nattereri* and *Philodryas nattereri* Steind. Other rare species only seen in this collection for the second time are the *Rhynchonyx ambiniger* Peters, *Rhadinæa occipitalis* Jan., *Leptognathus turgida* Cope, and *Scartiscus caducus* Cope. The number of species known and previously unknown is as follows:

|                  | New.     | Total.   |
|------------------|----------|----------|
| Batrachia .....  | 9        | 18       |
| Lacertilia ..... | 0        | 15       |
| Ophidia .....    | 3        | 29       |
|                  | <hr/> 12 | <hr/> 62 |

The Relative Weight of the Brain of *Regulus satrapa* and *Spizella domestica* compared to that of Man.—In the notices given by different writers on the relative weight of the brain to that of the body in different animals man has been given the foremost position. Thus, Landois<sup>2</sup> says the elephant has *absolutely* the heaviest brain, but man has *relatively* the heaviest brain. Surely this writer must have overlooked the little golden-crested kinglet and chipping sparrow, as the following facts seem to indicate. Two adults of the above-named specimens, which were taken in their native habitat last summer, were weighed with a view of comparison, with these results:

|  | Body.             | Brain.          |
|--|-------------------|-----------------|
| Golden-crested kinglet ( <i>Regulus satrapa</i> )..... | 97 $\frac{1}{2}$  | 4 $\frac{3}{8}$ |
| Chipping sparrow ( <i>Spizella domestica</i> ).....    | 173 $\frac{1}{2}$ | 7 $\frac{1}{2}$ |
| Designated in grains.                                  |                   |                 |

As generally stated, man's brain weighs  $\frac{1}{40}$  of that of the whole body. So far as the above figures show, the comparison bears out the following: the kinglet's brain weighs  $\frac{1}{22}$ , the sparrow's brain  $\frac{1}{23}$ , or nearer  $\frac{2}{45}$ , of that of the entire body respectively, the kinglet consequently having *relatively* the heaviest brain.—*Joseph L. Hancock, Chicago, Ill.*

**Zoological News.** PROTOZOA.—Dr. A. C. Stokes, of Trenton, N. J., describes eleven new species of American fresh-water Infusoria in the February number of the *Journal of the Royal Microscopical Society*, illustrating the same with a plate. Dr. Stokes thinks that identical species of Infusoria are not often found in the fresh waters of both the Old and the New Worlds, in which he will not receive the unanimous support of other workers in the same field.

<sup>2</sup> Landois, Phys., second ed., p. 706.

So-called eyes have often been described in the Protozoa. The latest instance is that of *Gymnodinium polyphemus*, described by Pouchet at a recent meeting of the French Academy. In this species of Flagellate there is described a strongly-refrigent lens seated in a cup of black or red pigment. The lens arises from the fusion of several refractive globules and the pigment-layer or choroid from the similar coalescence of pigment-granules. The animal, in swimming, always moves "eye" forwards.

SPONGES.—Students of the sponges are under a heavy debt to Dr. G. C. J. Vosmær, who has just completed the volume on the Porifera in Bronn's "Klassen und Ordnungen der Thierreichs." This work forms the only general account of the sponges, and will form a valuable book in the library of every naturalist.

Carter claims that the sponges recently described from the fresh-water fauna of Central Europe and Southern Russia as belonging to the genera *Dosilia* and *Ephydatia* in reality are members of the genus *Carterius* originally described by Mr. Potts from Fairmount Park, Philadelphia.

CÆLENTERATA.—The reef-corals of the "Challenger" Expedition are described in vol. xvi. of the Reports by J. J. Quelch. The collection contained two hundred and ninety-three species, seventy-three of which, all but two from the Pacific and Indo-Pacific, are described as new. The author merges the *Rugosa* in the *Madreporia Aporosa*. *Tabulæ* are present in some *Astræids*, absent in some *Rugosa*; some *Cyathophyllidæ* have no indication of a tetrameral type, while in some *Astræids* the septa are not multiples of six; the rugose character of only two sizes of septa is present in some *Astræidæ* and absent in some *Rugosæ*, etc. *Manicina areolata*, an undoubted reef-building coral, was found in Simon's Bay, at a depth of from ten to twenty fathoms, and at a temperature of 65° F. Eight species of *Millepora* are described in an appendix.

Mr. Guppy brings forward in *Nature* some observations which tend towards the conclusion that atolls and barrier-reefs owe their appearance at the surface to a movement of elevation. Most of the coral reefs and shoals are arrested at from five to twenty fathoms below the surface, and Mr. Guppy believes that they cannot come within the range of the constructive power of the breakers without the aid of an elevatory movement. To the breakers he (with Semper) ascribes the atoll form, the convexity being towards the prevailing currents. Large atolls begin to assume their shape below the surface. He claims to have independently worked out the same conclusion to which Le Conte arrived with regard to the Floridan reefs,—viz., that a barrier-reef is caused by a belt of growing coral limited on one side by the muddiness and on the other by the depth of the water. Under favorable conditions reef-corals will thrive at depths of

fifty to sixty fathoms. This accounts for the depths of some lagoons.

ECHINODERMS.—Messrs. Danielssen and Koren have described *Hyaster mirabilis*, an Asterid with a central dorsal appendage, generally erect, but capable of motion. The describers conjecture this to represent a larval stage of the Crinoidea, and suggest that further investigations may tend to prove that the Asteridea are developed from the Crinoidea. They also believe that all specimens of cluster-polyps yet found are mere varieties of *Umbellula encrinurus*.

Fossil remains of Holothurians are rare. Pocta describes some fenestrated plates from the Cretaceous of Bohemia, which he regards as belonging to the integument of some holothurian allied to *Psolus*. His paper may be found in vol. xcii. of the *Sitzungsberichte* of the Vienna Academy.

WORMS.—Marion describes two species of *Balanoglossus* in the *Archives de Zool. Exp.* (iv., 1886). One, which he calls *B. hacksi*, is from Japan; the other, *B. talaboti*, is from the Mediterranean. His descriptions are accompanied by many notes of the minute structure, but he does not express an opinion as to the systematic position of these forms. He alludes to the wide distribution of the genus as indicative of its antiquity, species being known from the North Sea, the west coast of France, the Mediterranean, Liberia, the Red Sea, Japan, the eastern coast of the United States, and Brazil. The cartilaginous support of the proboscis (Bateson's notochord) bears a marked histological resemblance to cartilage as found in the Vertebrates.

In the same number Poirier has a paper on the Diplostomatidæ, describing the structure of some of these parasites taken from the intestines of various Crocodilia. A detailed account is given of *Polycotyle ornata*, a parasite in the common alligator (*A. lucius*) of North America, which the author thinks should be placed with this family rather than with the Polystomidæ, where it had previously been placed.

Mr. E. C. Bousfield gives a full account of the habits and of the best methods of observing the genus *Dero*, which differs from the Naiades in having a respiratory apparatus at the end of the tail. He diagnoses seven species, of which four are new.

Mr. J. J. Fletcher has described nine new earth-worms from Australia,—seven Perichætæ, one *Cryptodrilus*, and one *Digaster*. The Perichætæ are separable into two groups, one characterized by the possession of complete circles of setæ, and by the presence of two cæcal appendages of the large intestine in segment xxvi.; the other by incomplete circles of setæ and no cæca.

The second number of the *Journal of the Trenton* (N. J.) *Natural History Society* contains an anonymous "key" to the genera

and species of North American Fresh-Water Polyzoa, illustrated by a plate of figures copied from various sources.

In the same publication Dr. T. O. Stevens gives a key to the genera and species of Rotifers recently described in the extensive monograph by Hudson and Gosse. In this connection it may be noted that no sooner is this large work completed than Mr. P. H. Gosse, one of the authors, describes (*Journal Royal Micros. Society*, February, 1887) twenty-four new species of Rotifera, illustrating them by two plates.

At the Linnæan Society Mr. S. O. Ridley recently described *Lophopus lendenfeldi*, from near Sydney, N. S. W. This is the fourth species of fresh-water polyzoon on record from Australia.

MOLLUSCS.—Part XVI. of the magnificent folio report of the Norwegian North Atlantic Expedition is devoted to the second installment of Herman Frieles's account of the Mollusca. It deals with the Pleurotomidæ, Cancellariidæ, and Brachiopods, and is illustrated by six plates. The work will prove invaluable to systematic students of the molluscan fauna of the North Atlantic.

Vol. xv. of the "Challenger" Reports is largely taken up with the Rev. R. Boog Watson's report on the Scaphopoda and Gasteropoda. About thirteen hundred species were collected. The Chitons collected by the "Challenger" were few. The really deep-sea forms belong to Leptochiton, of which four species were found, two of them new. These were taken at depths of from sixty to two thousand three hundred fathoms.

Mr. E. Heyle, in his report on the Cephalopoda of the "Challenger" Expedition, enumerates three hundred and eighty-eight species and sixty-eight genera, of which seventy-two species were met with. Thirty-two of these are described as new. None of these belong to the monster cuttles. Four new genera and one new species are established. Cirroteuthis has three species added, the largest, *C. magna*, eleven hundred and fifty-five millimetres long. In the new genus *Amphitretus* the mantle is fused with the siphon in the median line, so that there are two openings into the branchial sac. *A. pelagicus* was taken near the Kermadec Islands. Twenty kinds of Octopus were found, eleven of which are described as new. Ten new species are added to Sepia, and specific characters are found in the shell or sepiostaire. Two species of Taonius were found. *T. suhmi* was taken for a Clionid Pteropod by Willemoes-Suhm, and described as a new genus of Cephalopoda by Lankester.

The Marseniadæ are a family the types of which were the *Helix perspicua* of Linnæus and the *Bulla latens* of Müller. The species occur in all seas, and have the shell either altogether enveloped in the mantle or very partially exposed. Six genera and thirty-three species are recognized in vol. xv. of the "Challenger" Reports, eleven of them new.



CRUSTACEA.—Pelseneer gives a list of one hundred and ninety-seven crustaceans actually known from Belgium.

Dr. W. K. Brooks's description of the "Challenger" Stomatopods has been reprinted, with other papers, in the volume of "Selected Morphological Monographs" just issued by the Johns Hopkins University. It is a paper of one hundred and sixteen quarto pages and sixteen plates. The collections embraced only fifteen species of adults, but of these eight proved to be new. Together with these is described a new mantis-shrimp from North Carolina,—not embraced in the "Challenger" collections,—under the name *Lysiosquilla (Coronis) excavatrix*. The great value of the paper lies in its wealth of descriptions of larval forms by which Dr. Brooks has been able to rearrange the genera on a phylogenetic basis. In this connection it may be mentioned that last summer Dr. Brooks was successful in obtaining the eggs of a species of mantis-shrimp (*Gonodactylus*) in the Bahamas. Unlike all other crustaceans, these forms deposit their eggs, and do not carry them about with them. In this case the eggs were laid in the cavities of the coral-rock, and readily hatched in captivity.

Mr. Pascoe recently exhibited at the Linnæan Society specimens of a *Balanus* in which several individuals had united their shells into a common tube, and where the outer valves of each animal had lengthened, forming a series of irregular subsidiary tubes radiating from the apex of the primary one.

ARACHNIDA.—Nalepa has a long and well-illustrated paper on the anatomy of the Tyroglyphid mites in vol. xcii. of the *Sitzungsberichte* of the Vienna Academy.

TUNICATA.—M. Giard notes the finding of the Synascidians *Distaplia rosea* Della Valle and *Diazona hebridica* Forbes and Goodsir on the French seaboard.

FISHES.—M. A. Smith-Woodward has investigated the anatomy and scientific position of the Liassic Selachian, *Squaloraja polyspondyla*. Certain individuals, presumably females, are without the cephalic spine. He proposes a new family, to be placed between Pristiophoridae and Rhinobatidae.

Dr. Ramsey describes the common Jew-fish of Port Jackson as new, under the name of *Sciæna neglecta*, and points out the differences between it and *S. antarctica* Castlenau and *S. aquila* Lacépède, the species to which it has previously been referred. Evidence is also given that *Callionymus reevesii* is not the female of *C. curvicornis*.

Mr. Ogilby, of Sydney, describes *Pimelopterus meridionalis*.

REPTILES AND BATRACHIA.—Mr. G. A. Boulenger describes as new three South African tortoises, *T. trimeni*, *T. smithii*, and *T. fiski*, all allied to *T. geometrica*.

The taxidermist of the Victoria Museum at Jaffna, Ceylon, who died from the bite of a cobra which he presumed to be harmless, since its poison-bag was extracted, was for a while resuscitated by artificial respiration, and stated that while paralyzed by the poison he could see, hear, and feel everything, though utterly incapable of motion. Inflammation of the lungs caused his relapse and death.

Mr. G. A. Boulenger has discriminated two forms of Bombinator in Central Europe.

AVES.—Mr. Seebohm inclines to the assumption that the reason that the eggs of birds breeding in holes are white is that nature spares useless color, and he points out that there are traces of spots on the eggs of petrels and puffins, which breed in holes, a fact which tends to prove that it is only recently that they discontinued breeding in open places, like their relatives, the auks and gulls, which lay highly-colored eggs. He also points out that the females of pheasants and humming-birds, which breed in the open, are soberly colored, while the female kingfisher, who incubates concealed, is as gay as her mate.

MAMMALIA.—M. A. T. de Rochebrune has shown that the Colobi are platyrrhinous, like the apes of the New World.

C. W. de Vis has described as a probably new species of tree-kangaroo a specimen obtained in the Danitree River District. It is named *Dendrolagus bennettianus*, and is stated to be more nearly allied to *D. dorianus* than to *D. lumholtzi*.

#### EMBRYOLOGY.

The Development of the Carnivora.<sup>2</sup>—A. Fleischmann has lately carried out some interesting new investigations upon the development of the Carnivora, under the direction of Professor E. Selenka, in the Zoological Institute at Erlangen, on which he reports as follows:

Material was hard to obtain, in spite of the fact that cats and dogs are to be found as pets in every family. From one hundred to one hundred and fifty cats were examined weekly during the rutting periods in February and June. Later it was found possible to obtain materials from animals kept in confinement. Besides this, useful material was obtained through sportsmen from foxes and wild-cats.

A series of stages of the domestic cat was obtained by the successive extirpation of the horns of the uterus. The preservative fluid was picro-sulphuric acid, to which one-tenth per cent. of chromic acid had been added.

<sup>1</sup> Edited by Prof. JOHN A. RYDER, Biological Department, University of Pennsylvania, Philadelphia.

<sup>2</sup> Zur Entwicklungsgeschichte der Raubthiere, Biolog. Centralbl., vii., 1887, No. 1, pp. 9-12.